

On the Floral Glands of Parnassia palustris; new Physiological Functions. By M. E. HECKEL.

The beautiful floral glands which are admired by all observers in *Parnassia palustris* have long attracted the attention of physiologists from the point of view of their functions. From Conrad Sprengel to the present day most authors have thought that these singular organs play directly or indirectly an important part in the act of fecundation. Having had to observe this flower with reference to the staminal movement, and with the view of establishing, by resuming the study of this phenomenon*, a relation between the foliar and floral cycles, I was led, in order to utilize my many hours of observation, to divide my attention between the male organs and the glands in their neighbourhood. I observed them on the spot and under the most natural condition, during a residence in the environs of Murat (Cantal), at the end of August and the beginning of September.

The most important fact which struck me at the outset, and the observation of which has led me to doubt the reality of the part ascribed to the floral glands when they are regarded as destined to attract the insects which are the agents of fecundation, is the following:—The product of secretion, which is always limpid, and *does not contain the pollen fallen from the extrorse anthers*, far from being comparable to that of most nectaries, is not saccharine, has no peculiar odour, is sticky, and shows an acid reaction with litmus paper. A very simple experiment showed me that these glands are not indispensable to fecundation, and that, notwithstanding the defective arrangement of the anthers, this act is accomplished normally when the floral glands have been removed from the bud before arriving at their full development; lastly, a capital fact results from prolonged observation:—I have seen no insect penetrate into the perfect flowers except a few little Diptera, which, being perhaps attracted by the product of secretion of the glands forming a barrier round the andrœcium, are immediately stuck fast by this viscous liquid. As in the *Droseræ* I have remarked that, under the influence of the irritation produced by the presence of the insects, the liquid became more abundant; the animal soon died, and was broken up into its constituent parts. In order to appreciate better the action of this liquid, I applied to the largest of these glands very small pieces of raw flesh, which were at last dissolved, and disappeared, in the same way as in the case of the leaves of *Pinguicula vulgaris*. Would the fact which I here indicate, and which would lead me to see in the floral glands of *Parnassia palustris* a carnivorous organ, be an exception in the life of the plant? Must we see in it evidence of ancient habits which at a certain epoch characterized a whole series of plants which are unknown to us, and of which the *Parnassia* would only be an isolated term? It is difficult to reply to such

* It has already been very carefully observed by M. A. Gris (Comptes Rendus, tome lxxvii. p. 912, 1868).

questions ; but I would note that the fact which constitutes the subject of this note is not so novel as might be supposed. Jean Bauhin, in his 'Historia Plantarum' (1651), expresses himself as follows with regard to this same plant, which he calls *Gramen Parnassi*:—"Quinque radiatis staminibus, albis apicibus . . . quibus totidem interjecta alternatim staminum flavescentium *muscaria*." The double meaning of this last word may perfectly well be interpreted in favour of the fact which I now point out ; and the "flycatcher" would thus have been recognized more than two centuries ago.

M. Duval-Jouve, in connexion with these organs and with my observations, has been kind enough to communicate to me the manner in which he regards their morphological signification. With the learned botanist of Montpellier the *muscaria* would be organs derived from those that we meet with at the base of the petals of the Hellebores. If these glanduliferous twists be cleft longitudinally, we get, by spreading out the unrolled twist, the surface of a floral gland. To render the similitude more striking, it is necessary only to suppose the gland which occupies the bottom of the cone divided and transferred to the apex of each of the fibro-vascular axes which, as I have ascertained, exist to the number of from 13 to 15 in the parenchyma of the organ. According to this mode of contemplating the facts, the *Parnassia* would have to be placed close to the Ranunculaceæ, as has already been done ; but in accepting this interpretation it would be necessary to ascribe what seems to me a very wide part, not only to the transformation of the organ, but also to the physiological appropriation of its parts ; therefore, from the narrow point of view with which I have to do, I should be more willing to follow present systematists in approximating the *Parnassia* to the Saxifrageæ and Droseraceæ, which, as we know from Darwin*, include numerous cases of well-ascertained carnivory, whilst nothing of the sort has hitherto been observed among the Ranunculaceæ.—*Comptes Rendus*, January 3, 1876, p. 99.

"Ornithological Errors in the 'Reliquiæ Aquitanicæ.'"

To the Editors of the *Annals and Magazine of Natural History*.

GENTLEMEN,—Professor Jones (*Ann. & Mag. Nat. Hist.* ser. 4, xvii. pp. 263, 264) seems to charge me with unfairness in not imputing blame to him as regards the ornithological errors in the 'Reliquiæ Aquitanicæ.' If it will afford him any satisfaction, allow me to withdraw my expression so far as he is concerned, and impute to him the blame of not cancelling the sheet containing those errors, of which he was informed by me before it was issued to the public.

I have the honour to be, Gentlemen,

Magdalene College, Cambridge,
March 3, 1876.

Your obedient Servant,
ALFRED NEWTON.

* *Insectivorous Plants*, 1875.